

Editorial

Special Issue: Economic Growth, Trade and Technology

The papers in this special issue on ‘Economic Growth, Trade and Technology’ emerged from a conference which took place in Eindhoven, October 3–4, 1999. The conference was jointly organised by *Structural Change and Economic Dynamics* and the *Eindhoven Center for Innovation Studies (ECIS)*. The focus of this conference was to analyse the relationships between economic growth, international specialisation, and structural and technological change. The papers collected in this issue represent a sub-set of the papers presented at the conference and some further papers will be published in future issues of SCED. In the following we shall discuss the main issues addressed in the contributions to this issue:

A number of papers tackle the issue of whether ‘structural change’, defined as a reallocation of productive inputs across industrial activities, can be shown to significantly contribute to aggregate economic growth. Timmer and Szirmai’s paper (*Productivity Growth in Asian Manufacturing: The Structural Bonus Hypothesis Examined*) tackles this issue directly by means of a shift-share decomposition of aggregate growth of manufacturing industry in four Asian economies (India, Indonesia, South Korea, Taiwan) for the period 1963 to 1993. They find, rather surprisingly, that the ‘structural bonus’ hypothesis is not supported by the evidence on Asian industrial development. Reallocation of inputs within the manufacturing sector did not provide an extra bonus to aggregate productivity growth, in addition to growth in individual branches. This holds not only for labour productivity growth but also for total factor productivity growth. They also investigate whether this result depends on the fact that conventional shift-share analysis ignores the possibility of increasing returns to scale. However, they find that their results are robust to the inclusion of branch-specific economies of scale (Verdoorn effects). They conclude that in the Asian economies, over the period in question, aggregate productivity growth was driven by wide-spread productivity improvements across sectors, as successful developing countries with sufficient technological capabilities

have opportunities for technology catch-up and productivity growth across all manufacturing branches. The authors however, concede that the shift-share analysis is ill-equipped to deal with inter-industry spillovers and that this requires further investigation.

Jan Fagerberg (*Technological Progress, Structural Change and Productivity Growth: A Comparative Study*) applies the same type of decomposition technique as Timmer and Szirmai to investigate the relationship between structural change and economic growth. He applies this technique to a large sample of 39 countries and 24 industries over the period 1973–1990. Using this method, he finds again a very low impact of structural change (reallocation of inputs across industrial branches) on economic growth, while a focus on particular industries, in particular electronics, shows that specialisation in the technologically most innovative industry has significantly contributed to higher economic growth. In an interesting comparison with the results of the classic study by Salter (*Productivity and Technical Change*, 1960) he shows that, over the period for which Salter undertook his analysis (1924–1950), high productivity growth industries also increased their shares of employment to a much greater degree than was the case over the more recent period (1973–1990); hence the decomposition technique which measures the impact of structural change through employment shifts across sectors (towards industries with above average productivity levels) will naturally reveal a much lower impact for the more recent period. Again, the weakness of the technique is pointed out in that it cannot properly account for spillover effects. Adopting econometric methods, on the other hand, and regressing productivity growth in aggregate manufacturing upon the share of a particular industry (such as electrical machinery) can capture such spillover effects and, indeed, the positive impact is strongly significant. Of course, as Fagerberg points out, leading industries (with large technological spillover effects) change over time and so do the conditions for entry and the rewards from it; this requires caution in deriving policy implications from an analysis of past experiences.

Bruno Amable (*International Specialisation and Growth*) explores the relationship between international inter-industry specialisation, as revealed by a variety of indicators on foreign trade, and economic growth. His sample of 39 countries includes developed industrialised countries along with fast growing Asian countries and other NICs. He uses a panel data set with six 5-year intervals from 1960–65 to 1985–90 and hence explores the time series as well as the cross-section dimension of the data. In a series of growth regressions, he finds that international specialisation matters for growth. Countries whose foreign trade structure is more specialised at the inter-industry level have enjoyed faster productivity growth than less specialised countries. Furthermore, comparative advantage in electronics is a positive influence on growth. Education acts in complementarity with trade specialisation, reinforcing the positive effects of electronics. This result can also be interpreted such that a sufficiently high level of education of the work force is required to benefit from or achieve an advantage from specialisation in electronics. The results from Bruno Amable's analysis which looked at a group of either advanced economies or successful catching-up economies and which revealed benefits from trade specialisa-

tion contrasts with the results from other studies which have been estimated over a much wider set of countries and which showed a negative impact of trade specialisation on growth.

Ed Wolff (*Human Capital and Economic Growth: Exploring the Cross-Country Evidence*) examines the relationship between education and economic growth. He develops his econometric analysis from different theoretical approaches (human capital theory, catch-up models, education-technology relationships) that give rise to a multitude of specifications. Differently from a growth accounting approach, Wolff's econometric analysis (conducted for the OECD economies mostly for the period 1960-1990) does not reveal – in most cases – a significant role for education. Wolff attributes this rather negative result regarding the role of education for economic growth to a number of factors: data problems, particularly with regard to the international comparability of educational attainment; or, there might be a case of inverse causality in that education could be seen as a luxury good so that rising per capita income levels lead to more schooling, particularly at university level; furthermore, only some forms of schooling might be related to growth such as the general acquisition of basic literacy and numerical skills in primary school (which, however, does no longer play a role as discriminator across OECD economies which have all achieved a high level of basic education) or engineering and scientific training which does show up significantly in the growth regressions. Lastly, some forms of (particularly tertiary) education might encourage the growth of rent-seeking activities or of activities with little scope for measurable productivity growth (in the services sector) that yields a negative impact for productivity growth.

Thijs ten Raa and Ed Wolff (*Engines of Growth in the U.S. Economy*) develop a notion of 'engines of growth' in order to analyse the contribution of different industrial branches to aggregate TFP growth. They use a (general equilibrium) methodology to take account of two types of spillovers, direct spillovers and capital embodied spillovers to track a sector's contribution to an economy's productivity growth. The decomposition into direct and spillover effects is not one of standard growth accounting, as productivity is not counted in the sector where it occurs but in the sector that triggers it. The method allows the calculation of total returns to R&D spending which includes the impact on TFP both directly and indirectly, that is through spillovers. The top contributing sectors are called 'engines of growth' and are led by computers and office equipment and electronic components. Productivity spillovers explain their status as prime 'engines of growth' over the 1970s and 1980s.

Pierre Mohnen and Thijs ten Raa (*A General Equilibrium Analysis of the Evolution of Canadian Service Productivity*) develop a new methodology to impute different sectors' contributions to an economy's productivity growth. They relate an economy's production frontier to its fundamentals and define growth in productivity as a shift of that frontier. Employing linear programming techniques, the authors calculate Lagrange multipliers associated with (factor) endowment constraints and these multipliers are interpreted (in a competitive economy and with a given structure of demand) as the marginal productivities of labour and capital. The main empirical contribution of this paper lies in an examination of whether the

slowdown in total factor productivity since the mid-seventies is due to the increasing importance of services in the Canadian economy. The authors find that the sluggish productivity performance in services is limited to FIRE (finance, insurance and real estate) and to business and personal services. Transportation, trade and communication are not found to contribute negatively to overall productivity growth.

The papers in this issue are not the final verdict on the relationships between structural change and economic growth, between international specialisation and growth or between education/technological change and economic growth. However, they all develop either interesting new methodological approaches to these subject areas or they carefully employ existing methodologies on specific datasets with — at times- surprising results. We shall continue to publish important new research in this area.

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